2006

Research Update Meeting 2006 - SARE Project, Water and Plant Canopy Management: Sanding, Pruning, Irrigation, Drainage

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Water and plant canopy management: sanding, pruning, irrigation, drainage

SARE Project

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UMass Amherst Cranberry Station

SARE Project

- Funder requires grower participation and documentation of ‘outcomes’ (change in behavior or practice)
- Grower team helped to develop the project
- Primary theme is management of water and the plant canopy
- Identifying practices, integrating practices
- Demonstrating to other growers

- The primary goal is to develop, demonstrate, and implement grower-identified practices to:
  - Improve water and canopy management
  - Reduce costs and improve pest management

Low-cost practices with potential to increase fruit quality and contribute to pesticide reduction

- pruning (and use as an alternative to sanding)
- irrigation scheduling
- drainage improvement
- bed sanitation
- integrated nutrient management

Integrated approach

- Primary goal is to see how the practices fit together

- Example – design nutrient management to avoid excess vine growth and as a result need less sanding/pruning, improve air circulation, etc.

Anticipated outcomes of adoption

- A more open, drier canopy
- Improved air circulation
- Decreased duration of wetness events (reducing need for fungicides)
- Improved penetration of biorational pesticides
- Better fruit color
- Enhanced yield
- Eliminating or reducing the need for sanding

Demonstration sites – sanding and pruning

- Pruning and sanding being studied separately as presented earlier today
- The focus of these demonstration sites is to look at integrating a cycle of pruning into the sanding cycle to extend the interval between sanding

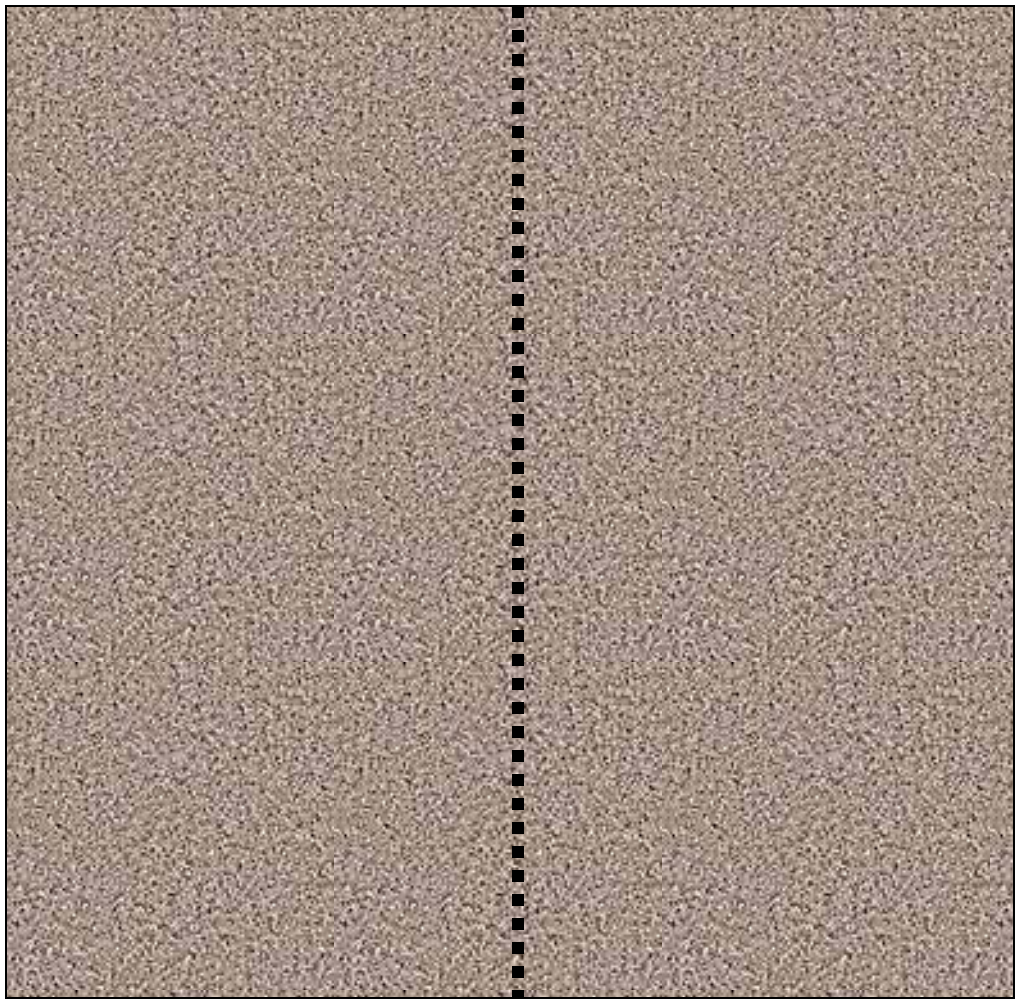
Grower Demonstration Plots

SARE GRANT

Side- by –Side Comparisons

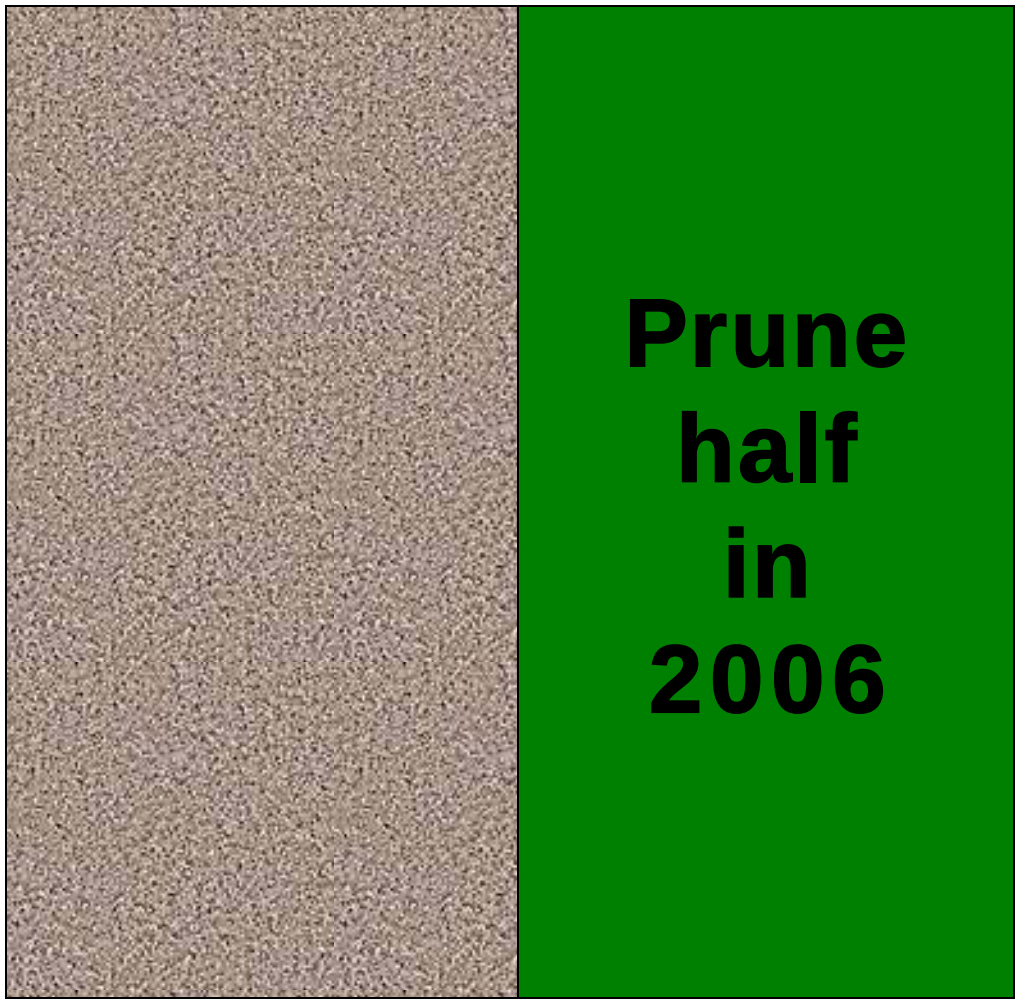
- Sanding, followed by pruning at some set interval
  - 2 yr, 3 yr, or 4 yr+
- Goal: 4 sites for each combination
- ‘Stevens’ preferred

Sanded whole piece in 02-03



EXAMPLE

Sanded whole piece in 02-03



3 - yr interval

Side- by –Side Comparisons

- Beds should be managed similarly
  - Drainage, fertilizer, pest pressures, irrigation, etc.
- Prefer treatments on same bed, but could be 2 sites located in same general area.
- Stevens preferred

Data Needed

You provide :

- Irrigation records
  - water level float
- Fertilizer records
- Pesticide records
- Harvest and TACY records

We collect :

- Weight of prunings removed
- Light bar data
- Vine samples
- Harvest samples

Plots in Hand

- 2-yr interval
  - Sanded 02-03; pruned in 2005 (1)
- 3-year interval
  - Sanded 00-01; pruned in 2004 (1)
- 4-yr + interval
  - Sanded 95-96; pruned in 2003 (1)

Please call if you would like to participate

Carolyn x25
Hilary x21

Sanding vs. Pruning Experiment

Question

- Can pruning be used as an alternative to sanding?

Plan

- Replicated study at Rocky bog
- Establish in Spring 2006
- 2-3 years
- MS Student Brett Suhayda

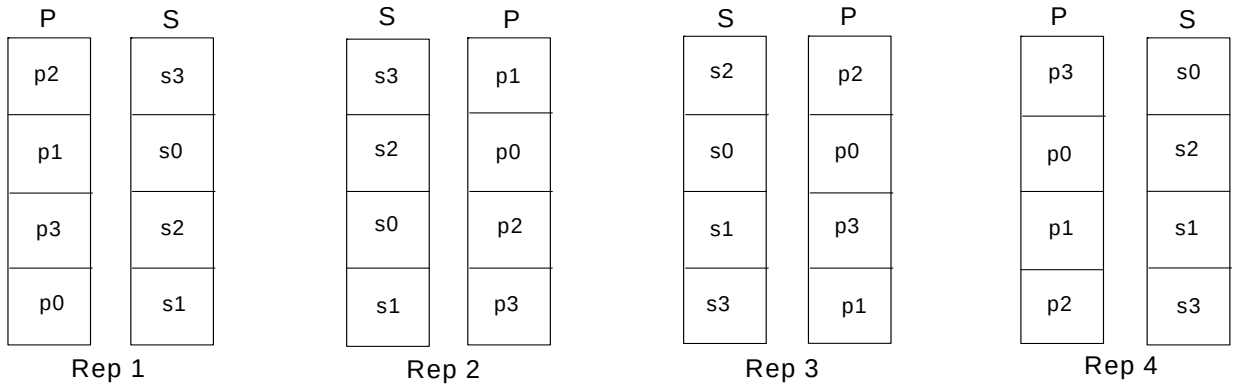


Figure 1: Split-plot design for Pruning vs. Sanding experiment

Evaluation of pruning/sanding

- Vegetative vine growth
- Yield
- Fruit quality
- Canopy microclimate
- Spray penetration into canopies

Economic Analysis

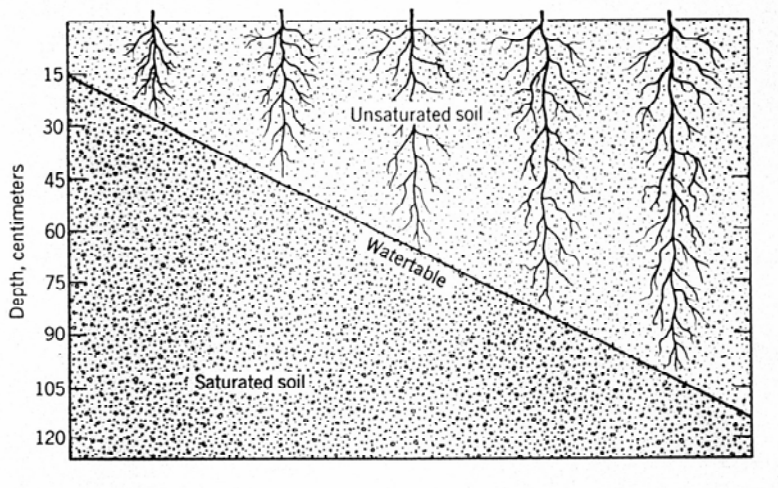
- Costs of pruning and sanding
- Economic return on yield (including color incentive)
- Reduced cost of pesticides

Irrigation scheduling

- Use of methods other than the inch-a-week rule

Why is it important?

- Saturated conditions (especially in spring)
  - Poor root development
  - Poor nutrient uptake
  - Poor release and utilization of nitrogen



- Too little water
  - Water stress
  - Decreased fruit size and quality
  - Poor plant stand
  - Plant death

Irrigation research

Lampinen and DeMoranville

- When beds are too wet yield is less
- Part of the reason is poor fruit set and retention

Yield (bbl/a) in irrigation treatments. Differences in 2000 and 2001 were statistically different.

Irrig. Treat.	1999	2000	2001	Cumulative 3 years
"ideal"	207	80	193	472
wetter	187	50	120	357
		*	*	

Data bears out the observation that most beds are too wet
1999 was the driest year of the three

Distribution of uprights into classes. Zero refers to uprights that flowered but did not support any fruit. Numbers one through three refer to uprights that supported that number of fruit. *indicates significant difference within row. 1999 and 2000 data were similar.

	2001	
Upright type	Ideal (%)	Wetter (%)
Non-flowering	61.9	63.1
Zero	18.1*	23.5*
One	17.6*	11.2*
Two	2.2*	1.4*
Three or more	0	0

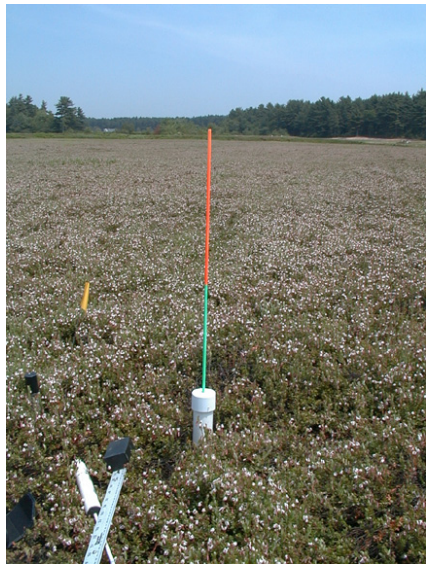
Failure to retain even one fruit accounted for decreased yield in standard (wetter) irrigation plots

Yellow vine

- Soil moisture is key
- Too wet or
  too dry
- Poor rooting
- Produced greenhouse
  symptoms
  if water table was too
  high or too low

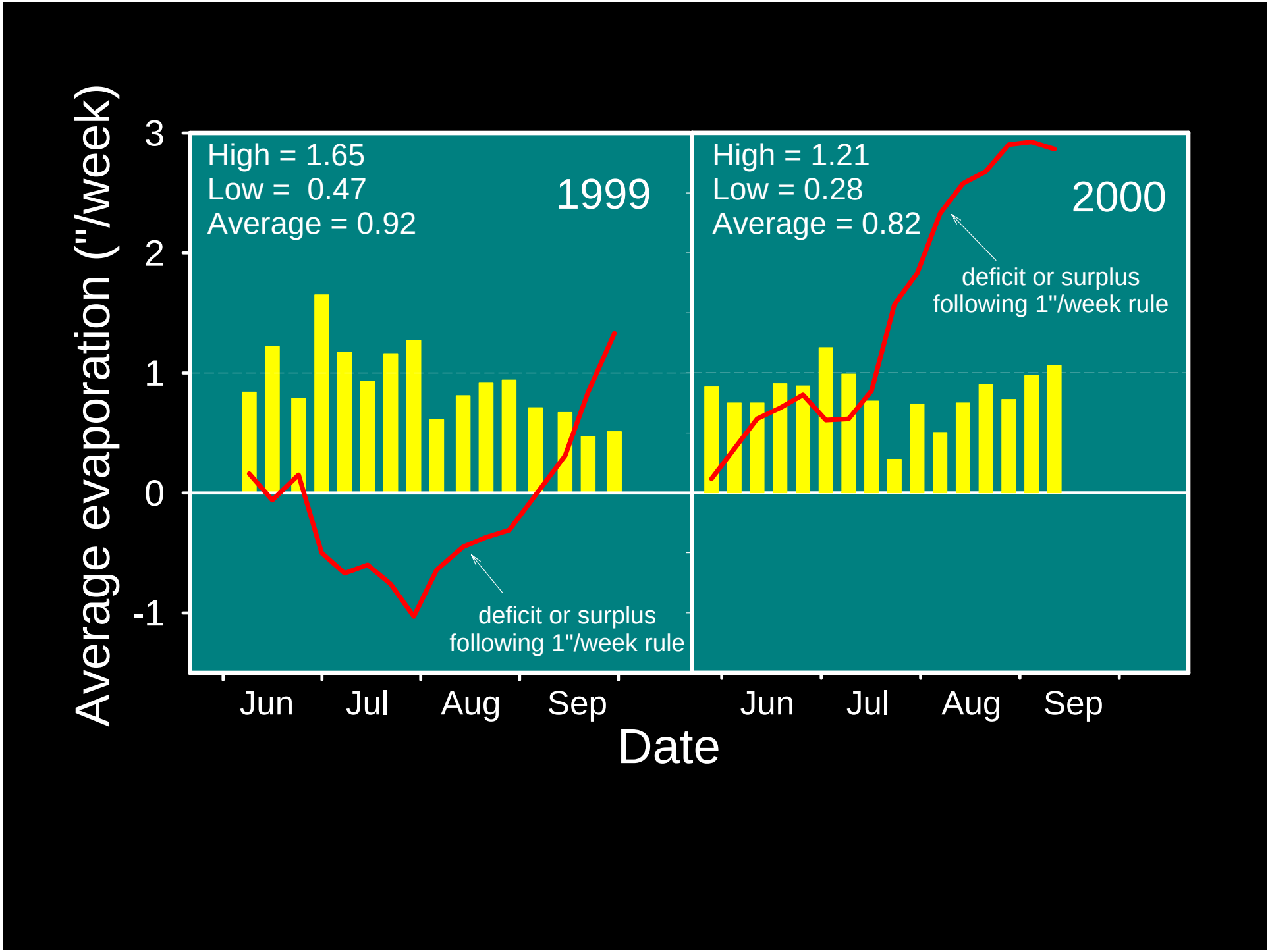
Important practices

- Drainage, drainage, drainage
- Insure adequate moisture into the fall, especially in drought years
- Properly schedule irrigation to avoid over- and under-watering



Both the calendar and 1”/week rule can lead to excess or deficiency

Evaporation gauge
was installed
at State Bog
during the summers
of 1999 and 2000

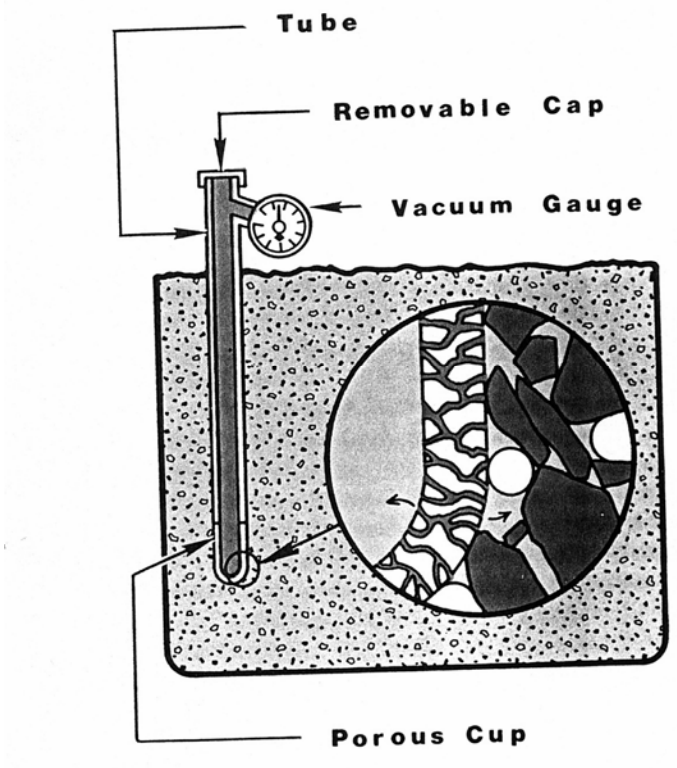

Average evaporation ("/week)
3
2
1
0
-1
High = 1.65
Low = 0.47
Average = 0.92
1999
deficit or surplus
following 1"/week rule
High = 1.21
Low = 0.28
Average = 0.82
2000
deficit or surplus
following 1"/week rule
Jun
Jul
Aug
Sep
Jun
Jul
Aug
Sep
Date

How much should I irrigate?

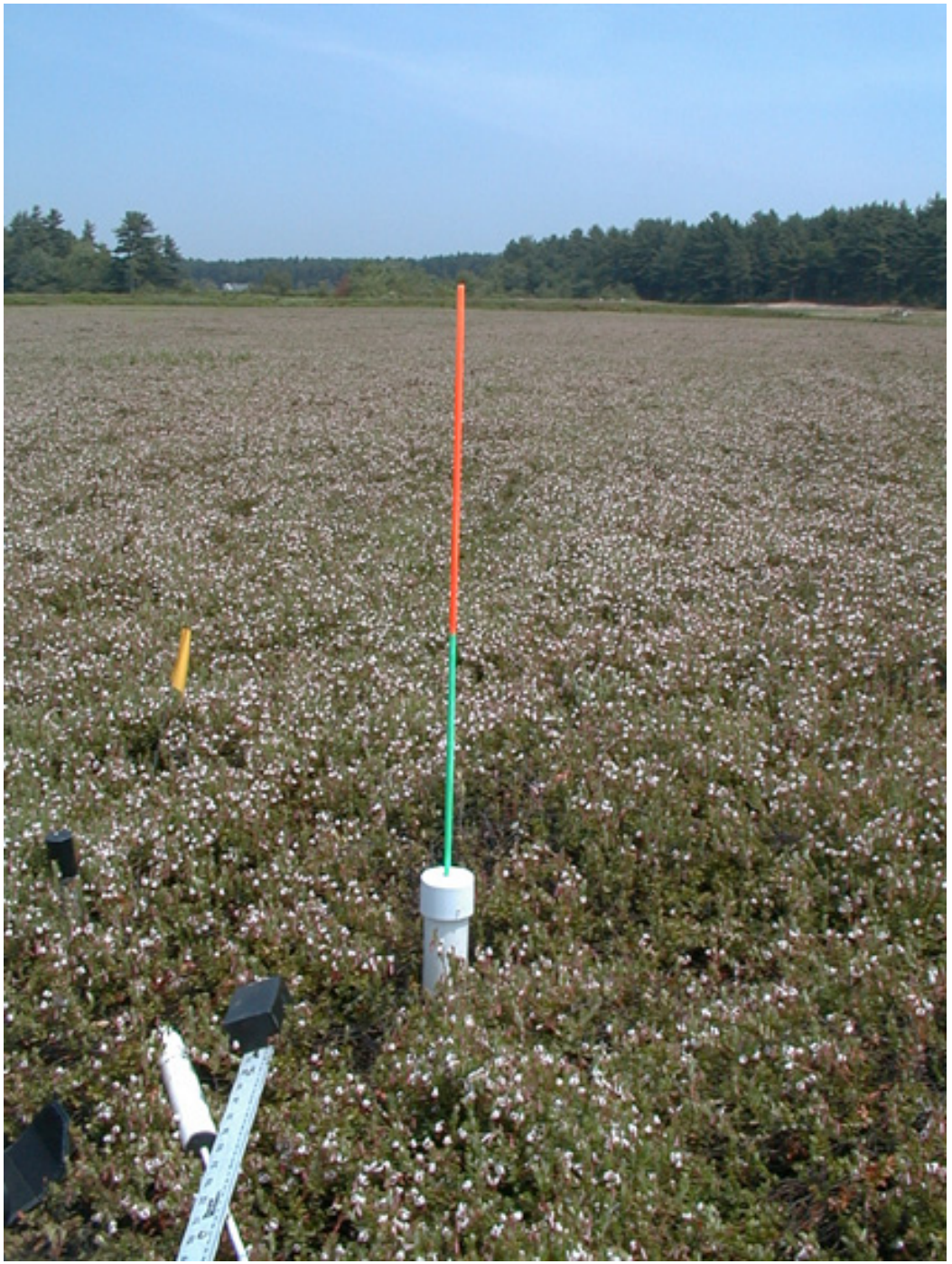
- Simple answer- enough to bring water table up to an adequate level without flooding root zone
- You need to know where the saturation level is – you must monitor soil moisture to know this

Tensiometer

- Advantages
  - Capable of measuring midday depression in soil moisture in root zone
  - Useful with or without a water table present
- Disadvantages
  - Relatively insensitive to water level changes
  - Relatively expensive
  - Requires foot traffic on bed to read



Water level float



Water level float

- Advantages
  - inexpensive to build (fact sheet available)
  - low maintenance, not susceptible to freezing damage
  - do not require walking on bed to read
  - more sensitive to changes in water table than tensiometer
- Disadvantages
  - doesn’t register midday depression in root zone
  - only useful on beds with water table present

- Water level float workshop in 2005
- More in 2006?

Questions?

Grower survey

- Fill it out now
- Help us to evaluate these practices
- This is the “before”

General Information

How many acres do you own or directly manage or work on? _____

Are you the decision maker for this acreage?

No

Sanding

What method(s) of **sanding** have you used in the last 5 years?

Check all that apply and circle preferred method

X Ice sanding	___Barge sanding
X On the vine	___Rail sanding

Sanding

What method(s) of sanding do you expect to use in the next 5 years?
Check all that apply and circle preferred method

__X__ Ice sanding ___Barge sanding
___On the vine ___Rail sanding
__X__ Other?_____

When you sand, what is your planned target depth?

¼ inch ½ inch 1 inch
other ?_____

Sanding

How well do you think you achieve the planned target depth?

~~Consistently close to target depth~~
Variable depending on location
~~Not even close~~

Do you have beds that you **sand** but never **prune**?

YES NO

How often do you hope to **sand** an individual piece (weather permitting)?

Every year Every other year Every 3 years
Every 5 years Never

Sanding

What do you hope to accomplish with your **sanding**? **Circle all that apply**

Pest management Improved vine growth

Increased light penetration Increased pesticide penetration

Ease of harvesting other?_____

Pruning

Do you have beds that you **prune** but never **sand**? YES NO

If yes, how often to you typically **prune** such a bed?

Every year Every other year Every 3 years

Every 5 years When necessary Never

Pruning

Do you have beds that you sometimes **prune** and sometimes **sand**? YES NO

If yes, how often to you typically **prune** such a bed?

Every year Every other year Every 3 years

Every 5 years When necessary Never

Pruning

What is the typical intensity of your **pruning**?

Light (less than 1/3 ton/a) Medium (½ to ¾ ton/a)

Heavy (1 or more ton/a)

When do you **prune**?

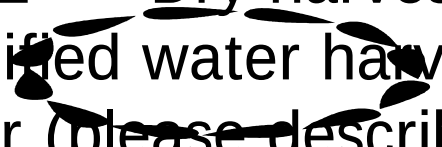
Spring Fall Other (list)_____

Pruning

What **pruning** equipment have you used in the last 5 years? **Circle all that apply**

NONE Dry harvest machine
Modified water harvester Manual knife rake
Other (please describe)_____

What **pruning** equipment do you expect to use in the next 5 years?



NONE Dry harvest machine
Modified water harvester Manual knife rake
Other (please describe)_____

Pruning

What do you hope to accomplish by **pruning**?

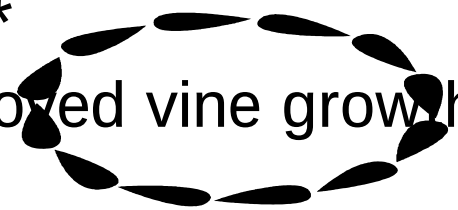
Circle all that apply

Pest management Improved vine growth

Increased light penetration

Ease of harvesting Increased pesticide penetration

Provide vines for planting I don't prune



Do you have bogs where you have intentionally alternated **sanding and pruning** in the last 10 years (in a planned way)?

YES NO

Nutrient Management

Do you use slow release fertilizers?

YES NO

If yes,

a) what type (brand) of slow release fertilizer do you use? (e.g. IBDU, osmocote)

IBDU 10-12-24

b) when do you apply slow release fertilizer?

early May or bud break

Nutrient Management

Do you use custom blend fertilizers?

YES NO

If yes, what is the NPK ratio in the custom mix?

(e.g. 18-10-12) _____20-8-10_____

Irrigation Scheduling

How do you decide when to irrigate?

Check all that apply and circle preferred method

Water level float Inch-a-week rule

Tensiometer (gauge) Touch test

Other monitoring device (probe, etc.)

_____

In mid-summer, if there is **no rain** during a week, how often would you irrigate?

Once Twice 3 times More than 3 times

Irrigation Scheduling

Approximately how long do you run sprinklers during an irrigation event?

1 hour 2 hours 3 hours 4 hours

Longer than 4 hours

When do you typically irrigate?

During the night Early morning/before 6 AM

Evening/after 7 PM Mid-day

other?_____

Irrigation Scheduling

If the Cranberry Station hosts a hands-on workshop on the construction and installation of water level floats in the Spring of 2006, how likely are you to attend?

Definitely Very likely Maybe

Probably not Would not

Drainage

Have you filled in interior ditches in the last 10 years? YES NO

If yes, why? _____easier harvest_____

In the last 10 years have you installed any submerged **drainage**? YES NO

If yes, circle type installed

Tile Pipe Gravel ditch

other?? (list) _____

Drainage

In the next 5 years, do you intend to install any submerged drainage? YES NO

If yes, circle type you intend to install

Tile Pipe Gravel ditch

other?? (list) _____

If you use submerged drainage, what reasons do you have for installing it?

Check all that apply and circle primary reason

X Eliminate wet spot X Bog too wet

X Replace surface ditches Disease management

other?? (list) -_____

Website

Have you visited the UMass Cranberry Station website? (YES) NO

If so, how often do you visit the website?
Daily (Weekly) Monthly Yearly

What pages do you visit on the Station site?
**Check all that apply and circle preferred*
X Newsletters X VPM message Calendar
Station personnel Research programs
X Chart Book X Weather updates Links
Recipes

Followup

Would you be willing to participate in a further interview regarding these practices and their costs?

YES NO

If yes, please give us your name and phone number

_____

See you after lunch

Be back here at 1:00